WHAT IS CLAIMED IS:

1. A light-emitting device comprising:

a multi-layer stack of materials including a light-generating region and a first layer supported by the light-generating region,

wherein:

a surface of the first layer is configured so that light generated by the light-generating region can emerge from the light-emitting device via the surface of the first layer;

the surface of the first layer has a dielectric function that varies spatially according to a pattern; and

the pattern is configured so that light generated by the light-generating region that emerges from the light-emitting device via the surface of the first layer is more collimated than a Lambertian distribution of light.

2. The light-emitting device of claim 1, wherein, when light generated by the light-generating region emerges from the light-emitting device via the surface of the first layer, at least about 40% of the light emerging via the surface of the first layer emerges within at most about 30° of an angle normal to the surface of the first layer.

3. The light-emitting device of claim 1, wherein the filling factor of the light-emitting device is at least about 10%.

4. The light-emitting device of claim 3, wherein the filling factor of the light-emitting device is at most about 75%.

5. The light-emitting device of claim 1, wherein the filling factor of the light-emitting device is at most about 75%.

6. The light-emitting device of claim 1, further comprising a support that supports the multi-layer stack of materials.

7. The light-emitting device of claim 6, further comprising a layer of reflective material that is capable of reflecting at least about 50% of light generated by the light-generating region that impinges on the layer of reflective material, the layer of reflective material being between the support and the multi-layer stack of materials.

8. The light-emitting device of claim 7, wherein the reflective material is a heat sink material.

9. The light-emitting device of claim 8, wherein the heat sink material is configured so that the heat sink material has a vertical heat gradient during use of the light-emitting device.

10. The light-emitting device of claim 7, further comprising a heat sink material.

11. The light-emitting device of claim 10, wherein the heat sink material is configured so that the heat sink material has a vertical heat gradient during use of the light-emitting device.

12. The light-emitting device of claim 1, further including a current-spreading layer between the first layer and the light-generating region.

13. The light-emitting device of claim 1, further comprising electrical contacts configured to inject current into the light-emitting device.

14. The light-emitting device of claim 13, wherein the electrical contacts are configured to vertically inject electrical current into the light-emitting device.

15. The light-emitting device of claim 1, wherein the light-emitting device is selected from the group consisting of light-emitting diodes, lasers, optical amplifiers, and combinations thereof.

16. The light-emitting device of claim 1, wherein the light-emitting device comprises a light emitting diode.

17. The light-emitting device of claim 1, wherein the light-emitting device is selected from the group consisting of OLEDs, flat surface-emitting LEDs, HBLEDs, and combinations thereof.

18. The light-emitting device of claim 1, wherein the pattern has an ideal lattice constant and a detuning parameter with a value greater than zero.

19. The light-emitting device of claim 1, wherein the pattern does not extend into the light-generating region.

20. The light-emitting device of claim 1, wherein the pattern does not extend beyond the first layer.

21. The light-emitting device of claim 1, wherein the pattern extends beyond the first layer.

22. The light-emitting device of claim 1, further comprising a layer of reflective material that is capable of reflecting at least about 50% of light generated by the light-generating region that impinges on the layer of reflective material,

wherein the light-generating region is between the layer of reflective material and the first layer.

23. The light-emitting device of claim 1, further comprising a layer of reflective material that is capable of reflecting at least about 50% of light generated by the light-generating region that impinges on the layer of reflective material, wherein the light-generating region is between the layer of reflective material and the first layer.

24. The light-emitting device of claim 1, wherein the pattern is a nonperiodic pattern or a complex periodic pattern.

25. A wafer, comprising:

a plurality of light-emitting devices, at least some of the light-emitting devices comprising:

a multi-layer stack of materials including a light-generating region and a first layer supported by the light-generating region, a surface of the first layer being configured so that light generated by the light-generating region can emerge from the light-emitting device via the surface of the first layer, the surface of the first layer having a dielectric function that varies spatially according to a pattern, and the pattern being configured so that light generated by the light-generating region that emerges from the light-emitting device via the surface of the first layer is more collimated than a Lambertian distribution of light,

wherein the wafer includes at least about five light-emitting devices per square centimeter.

26. The wafer of claim 25, wherein the wafer includes at least about 25 light-emitting devices per square centimeter.

27. The wafer of claim 25, wherein the wafer includes at least about 50 light-emitting devices per square centimeter.